

**RECEIVED**

JUN 12 2012

SUPERFUND DIVISION

June 1, 2012

Mr. Jason Gunter  
Remedial Project Manager  
U.S. Environmental Protection Agency  
Region 7 - Superfund Branch  
901 North 5<sup>th</sup> Street  
Kansas City, KS 66101

**Re: The Doe Run Company – Elvins/Rivermines Mine Tailings Site Monthly Progress Report**

Dear Mr. Gunter:

As required by Article VI, Section 56 of the Unilateral Administrative Order (UAO) (CERCLA-07-2005-0169) for the referenced project and on behalf of The Doe Run Company, the progress report for the period April 1, 2012 through April 30, 2012 is enclosed. If you have any questions or comments, please call me at 573-638-5020 or Mark Nations at 573-518-0800.

Sincerely,

Ty L. Morris, P.E., R.G.  
Vice President

TLM/jms  
Enclosures  
c: Mark Nations – TDRC  
Matt Wohl – TDRC (electronic only)  
Kathy Rangen – MDNR  
Tim Skoglund – Barr Engineering

40389793



Superfund

**Elvins/Rivermines Mine Tailings Site**  
Park Hills, Missouri  
**Removal Action - Monthly Progress Report**  
Period: April 1, 2012 – April 30, 2012

**1. Actions Performed and Problems Encountered This Period:**

- a. As has been previously discussed, clogging of the iron/sand media has been an issue with the pilot test. During the period, the bypass pipe that diverts flow around the ZVI/sand filter, aeration tank, and final sand filter remained active during the period.
- b. During the previous period, head losses slowly increased within the system causing overtopping of the roughing filter. To address this, the bypass pipe was flushed on April 6, 2012. White sediment was observed during the pipe flush. A smaller amount of black sediment was also observed. The black sediment appeared immediately after the white sediment had finished discharging from the pipe.
- c. Toward the end of this period, the roughing filter was observed to be overflowing again. It is anticipated that this will occur during the next period.
- d. Efforts to evaluate possible renovations to the iron/sand filter and system piping continued. Once the proposed renovation design has been determined, a description of the modifications will be sent to EPA. It is anticipated that this will occur towards the end of May.
- e. Planning for work on the full-scale treatment system began. The design for the system is based on the roughing filter utilized in the pilot test. Once the design has been completed, it will be provided to EPA for review and comment.
- f. Analytical sampling and field measurements continued two to three times a week for the duration of the month of April. No WET testing occurred in April.

**2. Analytical Data and Results Received This Period:**

- a. The removal percentage for dissolved zinc in the effluent coming from the bypass pipe was found to range between 88.2% and 99.9% with the exception of April 12, 2012 when the removal percentage was 69.1%. This equated to dissolved zinc levels that ranged between 5.6 µg/L and 2.21 mg/L (the April 12, 2012 sample recorded a dissolved zinc level of 7.19 mg/l).
- b. The removal percentage for total zinc in the effluent coming from the bypass pipe was found to range between 65.8% and 78.3%. This equated to total zinc levels that ranged between 5.85 mg/L and 7.12 mg/L.
- c. Iron concentrations in the system effluent coming from the bypass pipe ranged between 1.11 mg/L to 1.91 mg/L. Iron concentrations in the system influent have been consistently near 0.0 mg/l.
- d. Total suspended solids concentrations in the system effluent were not tested during the period.
- e. During this period, water samples were collected from just upstream of Old Missouri Highway 32, as well as from upstream and downstream of the confluence of the site discharge with Flat River. The analytical results for this event are included in this progress report.
- f. During this period, the Ambient Air Monitoring Report for fourth quarter 2011 was received. Any issues identified in this report are discussed below. A copy of this document has been sent to your attention.

The fourth quarter 2011 Ambient Air Monitoring Report noted the following:

- The action levels for lead and dust were not exceeded.
- No samples were taken with the TSP monitors on 10/20/11 due to training.

- No samples were taken with the TSP and PM<sub>10</sub> monitors on 11/14/11 due to training.
- No samples were taken with the TSP and PM<sub>10</sub> monitors on 11/23/11, 11/24/11, 11/25/11, and 11/26/11 due to the holiday.
- No samples were taken with the Big River #4 QA TSP monitor on 12/20/11 due to mechanical failure. Upon discovery, the issue was corrected.
- There was a QA blank filter associated with the Rivermines #1 (Office) TSP monitors and PM<sub>10</sub> on 12/28/11.
- No samples were taken with the TSP and PM<sub>10</sub> monitors on 12/22/11, 12/23/11, 12/26/11, 12/29/11, and 12/30/11 due to the holiday.

**3. Developments Anticipated and Work Scheduled for Next Period:**

- a. Continue analytical sampling and field measurements three times a week. No WET tests are planned at this time.
- b. Continue to operate the system with the bypass pipe through the month of April.
- c. Continue to discuss possible in-field bench testing of different iron media treatment options to assess possible options for this portion of the system. Onsite activities related to this may begin in April.
- d. Complete monthly water sampling activities as described in the Removal Action Work Plan.
- e. Complete air monitoring activities as described in the Removal Action Work Plan.
- f. Complete efforts to evaluate possible renovations to the iron/sand filter and system piping. It is anticipated that the proposed renovation design will be submitted in the next progress report. It is also anticipated that implementation of the modifications will begin in June.
- g. Planning for work on the full-scale treatment system will continue. Once the design has been completed, it will be provided to EPA for review and comment.

**4. Changes in Personnel:**

- a. None.

**5. Issues or Problems Arising This Period:**

- a. None.

**6. Resolution of Issues or Problems Arising This Period:**

- a. None.

**End of Monthly Progress Report**

May 03, 2012

Allison Olds  
Barr Engineering Company  
1001 Diamond Ridge  
Suite 1100  
Jefferson City, MO 65109  
TEL: (573) 638-5007  
FAX: (573) 638-5001



**RE:** Rivermines MS-25/86-0009

**WorkOrder:** 12041031

Dear Allison Olds:

TEKLAB, INC received 4 samples on 4/24/2012 11:00:00 AM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,



Michael L. Austin  
Project Manager  
(618)344-1004 ex 16  
MAustin@teklabinc.com



## Report Contents

<http://www.teklabinc.com/>

**Client:** Barr Engineering Company

**Client Project:** Rivermines MS-25/86-0009

**Work Order:** 12041031

**Report Date:** 03-May-12

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This reporting package includes the following:

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## Definitions

<http://www.teklabinc.com/>

**Client:** Barr Engineering Company

**Work Order:** 12041031

**Client Project:** Rivermines MS-25/86-0009

**Report Date:** 03-May-12

### Abbr Definition

CCV Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.

DF Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilutions factors.

DNI Did not ignite

DUP Laboratory duplicate is an aliquot of a sample taken from the same container under laboratory conditions for independent processing and analysis independently of the original aliquot.

ICV Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.

IDPH IL Dept. of Public Health

LCS Laboratory control sample, spiked with verified known amounts of analytes, is analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. The acceptable recovery range is in the QC Package (provided upon request).

LCSD Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).

MB Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.

MDL Method detection limit means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte.

MS Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).

MSD Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).

MW Molecular weight

ND Not Detected at the Reporting Limit

NELAP NELAP Accredited

PQL Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions. The acceptable recovery range is listed in the QC Package (provided upon request).

RL The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.

RPD Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).

SPK The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.

Surr Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.

TNTC Too numerous to count (> 200 CFU )

### Qualifiers

# - Unknown hydrocarbon

B - Analyte detected in associated Method Blank

E - Value above quantitation range

H - Holding times exceeded

M - Manual Integration used to determine area response

ND - Not Detected at the Reporting Limit

R - RPD outside accepted recovery limits

S - Spike Recovery outside recovery limits

X - Value exceeds Maximum Contaminant Level



## Case Narrative

<http://www.teklabinc.com/>

**Client:** Barr Engineering Company

**Client Project:** Rivermines MS-25/86-0009

**Work Order:** 12041031

**Report Date:** 03-May-12

**Cooler Receipt Temp:** 5.2 °C

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### Locations and Accreditations

Collinsville		Springfield		Kansas City	
Address	5445 Horseshoe Lake Road Collinsville, IL 62234-7425	Address	3920 Pintail Dr Springfield, IL 62711-9415	Address	8421 Nieman Road Lenexa, KS 66214
Phone	(618) 344-1004	Phone	(217) 698-1004	Phone	(913) 541-1998
Fax	(618) 344-1005	Fax	(217) 698-1005	Fax	(913) 541-1998
Email	jhriley@teklabinc.com	Email	kmcclain@teklabinc.com	Email	dthompson@teklabinc.com

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2013	Collinsville
Kansas	KDHE	E-10374	NELAP	1/31/2013	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2012	Collinsville
Louisiana	LDEQ	166578	NELAP	6/30/2012	Springfield
Arkansas	ADEQ	88-0966		3/14/2013	Collinsville
Illinois	IDPH	17584		4/30/2013	Collinsville
Kentucky	UST	0073		5/26/2014	Collinsville
Missouri	MDNR	00930		4/13/2013	Collinsville
Oklahoma	ODEQ	9978		8/31/2012	Collinsville



## Laboratory Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12041031

Client Project: Rivermines MS-25/86-0009

Report Date: 03-May-12

Lab ID: 12041031-001

Client Sample ID: RM-001

Matrix: AQUEOUS

Collection Date: 04/23/2012 13:15

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
<b>EPA 600 375.2 REV 2.0 1993 (TOTAL)</b>								
Sulfate	NELAP	500		1080	mg/L	50	04/26/2012 21:43	R162909
<b>STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED</b>								
Lab pH	NELAP	1.00		7.54		1	04/24/2012 12:42	R162744
<b>STANDARD METHODS 18TH ED. 2340 C</b>								
Hardness, as ( CaCO <sub>3</sub> )	NELAP	5		1240	mg/L	1	04/24/2012 14:25	R162803
<b>STANDARD METHODS 18TH ED. 2540 D</b>								
Total Suspended Solids	NELAP	6		6	mg/L	1	04/25/2012 8:46	R162831
<b>STANDARD METHODS 18TH ED. 2540 F</b>								
Solids, Settleable	NELAP	0.1		< 0.1	ml/L	1	04/24/2012 12:33	R162782
<b>STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON</b>								
Total Organic Carbon (TOC)	NELAP	1.0		< 1.0	mg/L	1	04/26/2012 16:31	R162912
<b>EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)</b>								
Cadmium	NELAP	2.00		13.1	µg/L	1	04/24/2012 18:44	77495
Zinc	NELAP	10.0	S	12000	µg/L	1	04/24/2012 18:44	77495
Zn - Sample concentration was greater than 5 times the spike concentration.								
<b>EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)</b>								
Cadmium	NELAP	2.00		15.3	µg/L	1	04/25/2012 12:47	77499
Zinc	NELAP	10.0		12700	µg/L	1	04/25/2012 12:47	77499
<b>STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)</b>								
Lead	NELAP	2.00	X	12.9	µg/L	1	04/25/2012 17:54	77498
<b>STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA</b>								
Lead	NELAP	2.00	X	13.0	µg/L	1	04/27/2012 11:00	77502



## Laboratory Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12041031

Client Project: Rivermines MS-25/86-0009

Report Date: 03-May-12

Lab ID: 12041031-002

Client Sample ID: RM-Dup

Matrix: AQUEOUS

Collection Date: 04/23/2012 13:25

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
<b>EPA 600 375.2 REV 2.0 1993 (TOTAL)</b>								
Sulfate	NELAP	500		1010	mg/L	50	05/02/2012 15:32	R163142
<b>STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED</b>								
Lab pH	NELAP	1.00		7.54		1	04/24/2012 12:42	R162744
<b>STANDARD METHODS 18TH ED. 2340 C</b>								
Hardness, as ( CaCO <sub>3</sub> )	NELAP	5		1240	mg/L	1	04/24/2012 14:25	R162803
<b>STANDARD METHODS 18TH ED. 2540 D</b>								
Total Suspended Solids	NELAP	6		< 6	mg/L	1	04/25/2012 8:46	R162831
<b>STANDARD METHODS 18TH ED. 2540 F</b>								
Solids, Settleable	NELAP	0.1		< 0.1	ml/L	1	04/24/2012 12:33	R162782
<b>STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON</b>								
Total Organic Carbon (TOC)	NELAP	1.0		1.0	mg/L	1	04/26/2012 16:38	R162912
<b>EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)</b>								
Cadmium	NELAP	2.00		13.3	µg/L	1	04/24/2012 19:01	77495
Zinc	NELAP	10.0		12000	µg/L	1	04/24/2012 19:01	77495
<b>EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)</b>								
Cadmium	NELAP	2.00		16.2	µg/L	1	04/25/2012 12:53	77499
Zinc	NELAP	10.0		13200	µg/L	1	04/25/2012 12:53	77499
<b>STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)</b>								
Lead	NELAP	2.00	X	12.5	µg/L	1	04/25/2012 18:04	77498
<b>STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA</b>								
Lead	NELAP	2.00	X	13.0	µg/L	1	04/27/2012 11:19	77502



## Laboratory Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12041031

Client Project: Rivermines MS-25/86-0009

Report Date: 03-May-12

Lab ID: 12041031-003

Client Sample ID: RM-DS

Matrix: AQUEOUS

Collection Date: 04/23/2012 13:50

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
<b>EPA 600 375.2 REV 2.0 1993 (TOTAL)</b>								
Sulfate	NELAP	50		155	mg/L	5	04/30/2012 19:18	R163045
<b>STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED</b>								
Lab pH	NELAP	1.00		8.00		1	04/24/2012 12:42	R162744
<b>STANDARD METHODS 18TH ED. 2340 C</b>								
Hardness, as ( CaCO <sub>3</sub> )	NELAP	5		380	mg/L	1	04/24/2012 14:25	R162803
<b>STANDARD METHODS 18TH ED. 2540 D</b>								
Total Suspended Solids	NELAP	6		< 6	mg/L	1	04/25/2012 8:46	R162831
<b>STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON</b>								
Total Organic Carbon (TOC)	NELAP	1.0		2.1	mg/L	1	04/26/2012 16:44	R162912
<b>EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)</b>								
Cadmium	NELAP	2.00		< 2.00	µg/L	1	04/24/2012 19:07	77495
Zinc	NELAP	10.0		786	µg/L	1	04/24/2012 19:07	77495
<b>EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)</b>								
Cadmium	NELAP	2.00		< 2.00	µg/L	1	04/25/2012 12:58	77499
Zinc	NELAP	10.0		856	µg/L	1	04/25/2012 12:58	77499
<b>STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)</b>								
Lead	NELAP	2.00		< 2.00	µg/L	1	04/25/2012 18:15	77498
<b>STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA</b>								
Lead	NELAP	2.00		3.86	µg/L	1	04/27/2012 11:22	77502



## Laboratory Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12041031

Client Project: Rivermines MS-25/86-0009

Report Date: 03-May-12

Lab ID: 12041031-004

Client Sample ID: RM-US

Matrix: AQUEOUS

Collection Date: 04/23/2012 12:55

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
<b>EPA 600 375.2 REV 2.0 1993 (TOTAL)</b>								
Sulfate	NELAP	10		31	mg/L	1	04/26/2012 21:53	R162909
<b>STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED</b>								
Lab pH	NELAP	1.00		8.05		1	04/24/2012 12:42	R162744
<b>STANDARD METHODS 18TH ED. 2340 C</b>								
Hardness, as ( CaCO <sub>3</sub> )	NELAP	5		240	mg/L	1	04/24/2012 14:25	R162803
<b>STANDARD METHODS 18TH ED. 2540 D</b>								
Total Suspended Solids	NELAP	6	R	7	mg/L	1	04/25/2012 8:46	R162831
% RPD was outside the QC limits due to low level results. When duplicate results for TSS are 20 mg/L or less and have a difference of no greater than the PQL, the results are considered within the precision of the test method and are reportable.								
<b>STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON</b>								
Total Organic Carbon (TOC)	NELAP	1.0		2.1	mg/L	1	04/26/2012 16:50	R162912
<b>EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)</b>								
Cadmium	NELAP	2.00		< 2.00	µg/L	1	04/24/2012 19:25	77495
Zinc	NELAP	10.0		< 10.0	µg/L	1	04/24/2012 19:25	77495
<b>EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)</b>								
Cadmium	NELAP	2.00		< 2.00	µg/L	1	04/25/2012 13:15	77499
Zinc	NELAP	10.0		< 10.0	µg/L	1	04/25/2012 13:15	77499
<b>STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)</b>								
Lead	NELAP	2.00		< 2.00	µg/L	1	04/25/2012 18:18	77498
<b>STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA</b>								
Lead	NELAP	2.00		< 2.00	µg/L	1	04/27/2012 11:25	77502



## Sample Summary

<http://www.teklabinc.com/>

**Client:** Barr Engineering Company

**Client Project:** Rivermines MS-25/86-0009

**Work Order:** 12041031

**Report Date:** 03-May-12

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
12041031-001	RM-001	Aqueous	5	04/23/2012 13:15
12041031-002	RM-Dup	Aqueous	5	04/23/2012 13:25
12041031-003	RM-DS	Aqueous	5	04/23/2012 13:50
12041031-004	RM-US	Aqueous	5	04/23/2012 12:55



## Dates Report

<http://www.teklabinc.com/>

**Client:** Barr Engineering Company

**Client Project:** Rivermines MS-25/86-0009

**Work Order:** 12041031

**Report Date:** 03-May-12

Sample ID	Client Sample ID	Collection Date	Received Date	
	Test Name		Prep Date/Time	Analysis Date/Time
12041031-001A	RM-001	04/23/2012 13:15	4/24/2012 11:00:00 AM	
	Standard Methods 18th Ed. 2540 F			04/24/2012 12:33
12041031-001B	RM-001	04/23/2012 13:15	4/24/2012 11:00:00 AM	
	EPA 600 375.2 Rev 2.0 1993 (Total)			04/26/2012 21:43
	Standard Method 18th Ed. 4500-H B, Laboratory Analyzed			04/24/2012 12:42
	Standard Methods 18th Ed. 2340 C			04/24/2012 14:25
	Standard Methods 18th Ed. 2540 D			04/25/2012 8:46
12041031-001C	RM-001	04/23/2012 13:15	4/24/2012 11:00:00 AM	
	EPA 600 4.1.4, 200.7R4.4, Metals by ICP (Total)		04/24/2012 14:17	04/25/2012 12:47
	Standard Methods 18th Ed. 3030 E, 3113 B, Metals by GFAA		04/24/2012 15:41	04/27/2012 11:00
12041031-001D	RM-001	04/23/2012 13:15	4/24/2012 11:00:00 AM	
	EPA 600 4.1.1, 200.7R4.4, Metals by ICP (Dissolved)		04/24/2012 13:35	04/24/2012 18:44
	Standard Methods 18th Ed. 3030 B, 3113 B, Metals by GFAA (Dissolved)		04/24/2012 14:06	04/25/2012 17:54
12041031-001E	RM-001	04/23/2012 13:15	4/24/2012 11:00:00 AM	
	Standard Methods 18th Ed. 5310 C, Organic Carbon			04/26/2012 16:31
12041031-002A	RM-Dup	04/23/2012 13:25	4/24/2012 11:00:00 AM	
	Standard Methods 18th Ed. 2540 F			04/24/2012 12:33
12041031-002B	RM-Dup	04/23/2012 13:25	4/24/2012 11:00:00 AM	
	EPA 600 375.2 Rev 2.0 1993 (Total)			05/02/2012 15:32
	Standard Method 18th Ed. 4500-H B, Laboratory Analyzed			04/24/2012 12:42
	Standard Methods 18th Ed. 2340 C			04/24/2012 14:25
	Standard Methods 18th Ed. 2540 D			04/25/2012 8:46
12041031-002C	RM-Dup	04/23/2012 13:25	4/24/2012 11:00:00 AM	
	EPA 600 4.1.4, 200.7R4.4, Metals by ICP (Total)		04/24/2012 14:17	04/25/2012 12:53
	Standard Methods 18th Ed. 3030 E, 3113 B, Metals by GFAA		04/24/2012 15:41	04/27/2012 11:19
12041031-002D	RM-Dup	04/23/2012 13:25	4/24/2012 11:00:00 AM	
	EPA 600 4.1.1, 200.7R4.4, Metals by ICP (Dissolved)		04/24/2012 13:35	04/24/2012 19:01
	Standard Methods 18th Ed. 3030 B, 3113 B, Metals by GFAA (Dissolved)		04/24/2012 14:06	04/25/2012 18:04
12041031-002E	RM-Dup	04/23/2012 13:25	4/24/2012 11:00:00 AM	
	Standard Methods 18th Ed. 5310 C, Organic Carbon			04/26/2012 16:38
12041031-003A	RM-DS	04/23/2012 13:50	4/24/2012 11:00:00 AM	
	Standard Method 18th Ed. 4500-H B, Laboratory Analyzed			04/24/2012 12:42
	Standard Methods 18th Ed. 2540 D			04/25/2012 8:46
12041031-003B	RM-DS	04/23/2012 13:50	4/24/2012 11:00:00 AM	
	EPA 600 375.2 Rev 2.0 1993 (Total)			04/30/2012 19:18
	Standard Methods 18th Ed. 2340 C			04/24/2012 14:25



## Dates Report

<http://www.teklabinc.com/>

**Client:** Barr Engineering Company

**Client Project:** Rivermines MS-25/86-0009

**Work Order:** 12041031

**Report Date:** 03-May-12

Sample ID	Client Sample ID	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
	Test Name				
12041031-003C	RM-DS	04/23/2012 13:50	4/24/2012 11:00:00 AM		
	EPA 600 4.1.4, 200.7R4.4, Metals by ICP (Total)		04/24/2012 14:17		04/25/2012 12:58
	Standard Methods 18th Ed. 3030 E, 3113 B, Metals by GFAA		04/24/2012 15:41		04/27/2012 11:22
12041031-003D	RM-DS	04/23/2012 13:50	4/24/2012 11:00:00 AM		
	EPA 600 4.1.1, 200.7R4.4, Metals by ICP (Dissolved)		04/24/2012 13:35		04/24/2012 19:07
	Standard Methods 18th Ed. 3030 B, 3113 B, Metals by GFAA (Dissolved)		04/24/2012 14:06		04/25/2012 18:15
12041031-003E	RM-DS	04/23/2012 13:50	4/24/2012 11:00:00 AM		
	Standard Methods 18th Ed. 5310 C, Organic Carbon				04/26/2012 16:44
12041031-004A	RM-US	04/23/2012 12:55	4/24/2012 11:00:00 AM		
	Standard Method 18th Ed. 4500-H B, Laboratory Analyzed				04/24/2012 12:42
	Standard Methods 18th Ed. 2540 D				04/25/2012 8:46
12041031-004B	RM-US	04/23/2012 12:55	4/24/2012 11:00:00 AM		
	EPA 600 375.2 Rev 2.0 1993 (Total)				04/26/2012 21:53
	Standard Methods 18th Ed. 2340 C				04/24/2012 14:25
12041031-004C	RM-US	04/23/2012 12:55	4/24/2012 11:00:00 AM		
	EPA 600 4.1.4, 200.7R4.4, Metals by ICP (Total)		04/24/2012 14:17		04/25/2012 13:15
	Standard Methods 18th Ed. 3030 E, 3113 B, Metals by GFAA		04/24/2012 15:41		04/27/2012 11:25
12041031-004D	RM-US	04/23/2012 12:55	4/24/2012 11:00:00 AM		
	EPA 600 4.1.1, 200.7R4.4, Metals by ICP (Dissolved)		04/24/2012 13:35		04/24/2012 19:25
	Standard Methods 18th Ed. 3030 B, 3113 B, Metals by GFAA (Dissolved)		04/24/2012 14:06		04/25/2012 18:18
12041031-004E	RM-US	04/23/2012 12:55	4/24/2012 11:00:00 AM		
	Standard Methods 18th Ed. 5310 C, Organic Carbon				04/26/2012 16:50



## Quality Control Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Client Project: Rivermines MS-25/86-0009

Work Order: 12041031

Report Date: 03-May-12

### EPA 600 375.2 REV 2.0 1993 (TOTAL)

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		< 10						04/26/2012

### Batch R162909 SampType: LCS Units mg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		22	20	0	109.6	90	110	04/26/2012

### Batch R162909 SampType: MS Units mg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		41	10	30.68	99.8	85	115	04/26/2012

### Batch R162909 SampType: MSD Units mg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
Sulfate	10		41	10	30.68	101.8	40.66	0.49	04/26/2012

### Batch R163045 SampType: MBLK Units mg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		< 10						04/30/2012

### Batch R163045 SampType: LCS Units mg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		22	20	0	108.3	90	110	04/30/2012

### Batch R163142 SampType: MBLK Units mg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		< 10						05/02/2012

### Batch R163142 SampType: LCS Units mg/L

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
Sulfate	10		20	20	0	101.7	90	110	05/02/2012



## Quality Control Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12041031

Client Project: Rivermines MS-25/86-0009

Report Date: 03-May-12

### STANDARD METHOD 18TH ED. 4500-H B, LABORATORY ANALYZED

Batch	R162744	SampType:	LCS	Units	Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
					Lab pH	1.00		6.99	7.00	0	99.9	99.1	100.8	04/24/2012
Batch	R162744	SampType:	DUP	Units	Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
					Lab pH	1.00		7.56				7.540	0.26	04/24/2012
Batch	R162744	SampType:	DUP	Units	Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
					Lab pH	1.00		7.57				7.540	0.40	04/24/2012
Batch	R162744	SampType:	DUP	Units	Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
					Lab pH	1.00		8.00				8.000	0.00	04/24/2012
Batch	R162744	SampType:	DUP	Units	Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed
					Lab pH	1.00		8.06				8.050	0.12	04/24/2012

### STANDARD METHODS 18TH ED. 2340 C

Batch	R162803	SampType:	MBLK	Units mg/L	Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
					Hardness, as ( CaCO <sub>3</sub> )	5		< 5						04/24/2012
Batch	R162803	SampType:	LCS	Units mg/L	Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
					Hardness, as ( CaCO <sub>3</sub> )	5		1020	1000	0	102.0	90	110	04/24/2012
Batch	R162803	SampType:	MS	Units mg/L	Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed
					Hardness, as ( CaCO <sub>3</sub> )	5		640	400	240.0	100.0	85	115	04/24/2012

# Quality Control Results

<http://www.teklabinc.com/>
**Client:** Barr Engineering Company

**Work Order:** 12041031

**Client Project:** Rivermines MS-25/86-0009

**Report Date:** 03-May-12

**STANDARD METHODS 18TH ED. 2340 C**

Batch	R162803	SampType:	MSD	Units	mg/L		RPD Limit	10		Date		
SampID:	12041031-004BMSD											
Analyses				RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Analyzed
Hardness, as ( CaCO <sub>3</sub> )				5		620	400	240.0	95.0	640.0	3.17	04/24/2012

**STANDARD METHODS 18TH ED. 2540 D**

Batch	R162831	SampType:	MBLK	Units	mg/L		Low Limit	High Limit		Date		
SampID:	MBLK											
Analyses				RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Suspended Solids				6		< 6						04/25/2012

**Batch R162831 SampType: LCS Units mg/L**

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit		Date
Total Suspended Solids	6		100	100	0	100.0	85	115		04/25/2012
Total Suspended Solids	6		108	100	0	108.0	85	115		04/25/2012
Total Suspended Solids	6		106	100	0	106.0	85	115		04/25/2012

**Batch R162831 SampType: DUP Units mg/L**

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit		Date
Total Suspended Solids	6	R	10				7.000	35.29		04/25/2012

**STANDARD METHODS 18TH ED. 5310 C, ORGANIC CARBON**

Batch	R162912	SampType:	MBLK	Units	mg/L		Low Limit	High Limit		Date		
SampID:	ICB/MBLK											
Analyses				RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Analyzed
Total Organic Carbon (TOC)				1.0		< 1.0						04/26/2012

**Batch R162912 SampType: LCS Units mg/L**

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit		Date
Total Organic Carbon (TOC)	5.0		50.4	48.2	0	104.5	89.6	109.5		04/26/2012

**Batch R162912 SampType: MS Units mg/L**

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit		Date
Total Organic Carbon (TOC)	1.0		7.1	5.0	2.140	98.4	80	120		04/26/2012

**Batch R162912 SampType: MSD Units mg/L**

Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit		Date
Total Organic Carbon (TOC)	1.0		7.0	5.0	2.140	97.4	7.060	0.71		04/26/2012



## Quality Control Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12041031

Client Project: Rivermines MS-25/86-0009

Report Date: 03-May-12

### EPA 600 4.1.1, 200.7R4.4, METALS BY ICP (DISSOLVED)

Batch	77495	SampType:	MBLK	Units	µg/L						Date Analyzed
Analyses											
Cadmium			2.00		< 2.00	2.00	0	0	-100	100	04/24/2012
Zinc			10.0		< 10.0	10.0	0	0	-100	100	04/24/2012

Batch	77495	SampType:	LCS	Units	µg/L						Date Analyzed
Analyses											
Cadmium			2.00		45.0	50.0	0	90.0	85	115	04/24/2012
Zinc			10.0		476	500	0	95.1	85	115	04/24/2012

Batch	77495	SampType:	MS	Units	µg/L						Date Analyzed
Analyses											
Cadmium			2.00		54.8	50.0	13.1	83.4	75	125	04/24/2012
Zinc			10.0		12500	500	11980	106.0	75	125	04/24/2012

Batch	77495	SampType:	MSD	Units	µg/L						RPD Limit 20
Analyses											
Cadmium			2.00		54.9	50.0	13.1	83.6	54.8	0.18	04/24/2012
Zinc			10.0	S	12300	500	11980	62.0	12510	1.77	04/24/2012

EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)											
Batch	77499	SampType:	MBLK	Units	µg/L						Date Analyzed
Analyses											
Cadmium			2.00		< 2.00	2.00	0	0	-100	100	04/25/2012
Zinc			10.0		< 10.0	10.0	0	22.0	-100	100	04/25/2012

Batch	77499	SampType:	LCS	Units	µg/L						Date Analyzed
Analyses											
Cadmium			2.00		49.0	50.0	0	98.0	85	115	04/25/2012
Zinc			10.0		511	500	0	102.1	85	115	04/25/2012

Batch	77499	SampType:	MS	Units	µg/L						Date Analyzed
Analyses											
Cadmium			2.00		52.7	50.0	1.7	102.0	75	125	04/25/2012
Zinc			10.0		1410	500	856.2	110.8	75	125	04/25/2012

## Quality Control Results

<http://www.teklabinc.com/>
**Client:** Barr Engineering Company

**Work Order:** 12041031

**Client Project:** Rivermines MS-25/86-0009

**Report Date:** 03-May-12

**EPA 600 4.1.4, 200.7R4.4, METALS BY ICP (TOTAL)**

Batch	77499	SampType:	MSD	Units	µg/L	RPD Limit 20				Date Analyzed
SampID: 12041031-003CMSD										
Analyses		RL	Qual		Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD
Cadmium		2.00			52.5	50.0	1.7	101.6	52.7	0.38
Zinc		10.0			1390	500	856.2	106.4	1410	1.57
										04/25/2012

**STANDARD METHODS 18TH ED. 3030 B, 3113 B, METALS BY GFAA (DISSOLVED)**

Batch	77498	SampType:	MBLK	Units	µg/L	Date Analyzed				
SampID: MB-77498										
Analyses		RL	Qual		Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit
Lead		2.00			< 2.00	2.00	0	0	-100	100
Lead		2.00			< 2.00	2.00	0	26.9	-100	100
										04/27/2012
										04/25/2012

**Batch 77498 SampType: LCS Units µg/L**

Batch	77498	SampType:	LCS	Units	µg/L	Date Analyzed				
SampID: LCS-77498										
Analyses		RL	Qual		Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit
Lead		2.00			14.5	15.0	0	96.4	85	115
Lead		2.00			15.6	15.0	0	104.0	85	115
										04/27/2012
										04/25/2012

**Batch 77498 SampType: MS Units µg/L**

Batch	77498	SampType:	MS	Units	µg/L	Date Analyzed				
SampID: 12041031-002DMS										
Analyses		RL	Qual		Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit
Lead		2.00			24.2	15.0	12.5321	77.7	70	130

**Batch 77498 SampType: MSD Units µg/L**

Batch	77498	SampType:	MSD	Units	µg/L	Date Analyzed				
SampID: 12041031-002DMSD										
Analyses		RL	Qual		Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD
Lead		2.00			23.9	15.0	12.5321	75.7	24.1943	1.27

**STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA**

Batch	77502	SampType:	MBLK	Units	µg/L	Date Analyzed				
SampID: MB-77502										
Analyses		RL	Qual		Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit
Lead		2.00			< 2.00	2.00	0	0	-100	100

**Batch 77502 SampType: LCS Units µg/L**

Batch	77502	SampType:	LCS	Units	µg/L	Date Analyzed				
SampID: LCS-77502										
Analyses		RL	Qual		Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit
Lead		2.00			15.4	15.0	0	102.4	85	115

**Batch 77502 SampType: MS Units µg/L**

Batch	77502	SampType:	MS	Units	µg/L	Date Analyzed				
SampID: 12041031-001CMS										
Analyses		RL	Qual		Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit
Lead		4.00			27.2	15.0	12.9593	95.1	70	130



## Quality Control Results

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12041031

Client Project: Rivermines MS-25/86-0009

Report Date: 03-May-12

### STANDARD METHODS 18TH ED. 3030 E, 3113 B, METALS BY GFAA

Batch	77502	SampType:	MSD	Units	µg/L	RPD Limit 20			Date	Analyzed	
SampID: 12041031-001CMSD											
Analyses		RL	Qual	Result	Spike	SPK	Ref Val	%REC	RPD	Ref Val	%RPD
Lead		4.00		26.3	15.0	12.9593	89.2		27.229	3.30	04/27/2012



## Receiving Check List

<http://www.teklabinc.com/>

Client: Barr Engineering Company

Work Order: 12041031

Client Project: Rivermines MS-25/86-0009

Report Date: 03-May-12

Carrier: Heather Riley

Received By: SRH

Completed by:

On:

24-Apr-12

Timothy W. Mathis

Reviewed by:

On:

24-Apr-12

Michael L. Austin

Pages to follow:

Chain of custody

1

Extra pages included

0

Shipping container/cooler in good condition?

Yes

No

Not Present

Temp °C 5.2

Blue Ice

Dry Ice

Type of thermal preservation?

None

Ice

Chain of custody present?

Yes

No

Chain of custody signed when relinquished and received?

Yes

No

Chain of custody agrees with sample labels?

Yes

No

Samples in proper container/bottle?

Yes

No

Sample containers intact?

Yes

No

Sufficient sample volume for indicated test?

Yes

No

All samples received within holding time?

Yes

No

Reported field parameters measured:

Field

Lab

NA

Container/Temp Blank temperature in compliance?

Yes

No

*When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.*

Water – at least one vial per sample has zero headspace?

Yes

No

No VOA vials

Water - TOX containers have zero headspace?

Yes

No

No TOX containers

Water - pH acceptable upon receipt?

Yes

No

Any No responses must be detailed below or on the COC.

Custody seal(s) intact on shipping container/cooler.

Sample Information

## Teklab Chain of Custody

Pg. 1 of 1 Workorder 12041031

5445 Horseshoe Lake Road ~ Collinsville, IL 62234 ~ Phone: (618)344-1004 ~ Fax: (618)344-1005

Barr Engineering Co.

Are the samples chilled?  Yes  No with:  Ice  Blue ice

Preserved in  Lab  Field

1001 Diamond Ridge, Suite 1100

Cooler Temp 6.2 Sampler Chris Schulte

Jefferson City

MO

65109

Comments

Invoice to Mark Nations. Results to Allison Olds and Mark Nations, mnations@doerun.com  
Matrix is surface water.  
Metals = Cd, Pb, Zn

CUSTODY seal place here

Rivermines MS - 25/86-0009

Contact Allison Olds eMail aolds@barr.com Phone 573-638-5007 Requested Due Date Standard Billing/PO Per contract with Doe Run

Lab Use	Sample ID	Sample Date/Time	Preservative Matrix	pH	T.S.S.	Sulfate	Settleable Solids	T.O.C.	Total Metals	Dissolved Metals	Hardness				
001	RM-001	4/23/12 / 13:15	Unpres 5	Aqueous	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
002	RM-Dup		13:25	Unpres 5	Aqueous	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
003	RM-DS		13:58	Unpres 5	Aqueous	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
004	RM-US		12:55	Unpres 5	Aqueous	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
				Unpres	Aqueous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
				Unpres	Aqueous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
				Unpres	Aqueous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
				Unpres	Aqueous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						

Teklab Inc.  
Courier Pick Up

Relinquished By*	Date/Time	Received By	Date/Time
Heather B Heather B	4/23/12 / 14:45 4/24/12 11:00	Heather B Heather B	4/24/12 9:45 4/24/12 11:00

\*The individual signing this agreement on behalf of client acknowledges that they have read and understand the terms of this agreement and that they have the authority to sign on behalf of client.

# THE DOE RUN COMPANY

## SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/2/12	12-2041	RM SEEP T	77	28720^	7.9	25	807	2.1	ND	191	6.98
4/2/12	12-2041	RM SEEP D		28480^					ND		
4/2/12	12-2042	RMP ROUGH T	4.0	6389^	ND	ND	307	ND	1703^	196	6.83
4/2/12	12-2042	RMP ROUGH D		2027^					1514^		

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



Quentin J. Schmidt Analytical Laboratory  
43 Iron County Road No 1 Bldg 3  
Viburnum, MO 65566  
(573) 244-8105

## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2041, L12-0001-2042

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.03	0.38	4/3/12	
Copper	ug/L	ND	0.97	4/3/12	
Lead	ug/L	ND	2.7	4/3/12	
Zinc	ug/L	ND	0.91	4/3/12	
Nickel	ug/L	0.04	0.86	4/3/12	
Thallium	ug/L	ND	1.86	4/3/12	
Iron	ug/L	ND	NA	4/3/12	

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2041, L12-0001-2042

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/3/12	
Iron	ug/L	ND	NA	4/3/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	482	96%	85-125%	
Copper	ug/L	500	488	98%	85-125%	
Lead	ug/L	500	484	97%	85-125%	
Zinc	ug/L	500	480	96%	85-125%	
Nickel	ug/L	500	484	97%	85-125%	
Iron	ug/L	500	481	96%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	483	97%	85-125%	
Iron	ug/L	500	483	97%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2042 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	573	573	115%	115%	75-125%	
Copper	ug/L	0	500	500	534	529	107%	106%	75-125%	
Lead	ug/L	0.57	500	500	536	534	107%	107%	75-125%	
Zinc	ug/L	64	500	500	660	663	119%	120%	75-125%	
Nickel	ug/L	4.1	500	500	533	533	106%	106%	75-125%	
Iron	ug/L	17	500	500	544	541	105%	105%	75-125%	



Quentin J. Schmidt Analytical Laboratory  
43 Iron County Road No 1 Bldg 3  
Viburnum, MO 65566  
(573) 244-8105

## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2041, L12-0001-2042

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	3.01	5	4/5/12	

#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	96.2	96%	85-115%	

#### LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	96.2	96%	85-115%	

#### LABORATORY SAMPLE DUPLICATE 12-2041

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	191.4	192.4	101%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.00	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	10	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	10.01	9.96-10.06	L11-0002-0079
Slope	99.1%	90-102%	



Quentin J. Schmidt Analytical Laboratory  
43 Iron County Road No 1 Bldg 3  
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(573) 244-8105

## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

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#### METHOD BLANK      MATRIX:

Associated Lab Samples: L12-0001-2041, L12-0001-2042

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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#### MATRIX SPIKE SAMPLE

##### SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

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#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115		



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## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
A	1/100 Dilution

#### ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.  
**M** Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.  
**R** RPD value was outside control limits.

**NES** Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	TLL

Report Acceptance	
QAO	Date
GWP	
Manager	Date
EJS	

**THE DOE RUN COMPANY**

**SEMO DIVISION -- CENTRAL LABORATORY**

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/4/12	12-2126	RM SEEP T	68	23430^	9.5	27	761	1.0 J	6.0	188	7.23
4/4/12	12-2126	RM SEEP D	22110^						9.4***		
4/4/12	12-2127	RMP ROUGH T	3.8	6975^	ND	ND	274	ND	1855^	202	6.87
4/4/12	12-2127	RMP ROUGH D	710						1960****		

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



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## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2126, L12-0001-2127

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	ND	0.38	4/4/12	
Copper	ug/L	ND	0.97	4/4/12	
Lead	ug/L	0.62	2.7	4/4/12	
Zinc	ug/L	ND	0.91	4/4/12	
Nickel	ug/L	ND	0.86	4/4/12	
Thallium	ug/L	0.92	1.86	4/4/12	
Iron	ug/L	1.6	NA	4/4/12	

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2126, L12-0001-2127

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/4/12	
Iron	ug/L	ND	NA	4/4/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	517	103%	85-125%	
Copper	ug/L	500	485	97%	85-125%	
Lead	ug/L	500	514	103%	85-125%	
Zinc	ug/L	500	517	103%	85-125%	
Nickel	ug/L	500	517	103%	85-125%	
Iron	ug/L	500	492	98%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	466	93%	85-125%	
Iron	ug/L	500	471	94%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2127 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0.06	500	500	514	511	103%	102%	75-125%	
Copper	ug/L	0	500	500	494	485	99%	97%	75-125%	
Lead	ug/L	0.28	500	500	512	509	102%	102%	75-125%	
Zinc	ug/L	70	500	500	585	580	103%	102%	75-125%	
Nickel	ug/L	3.9	500	500	514	511	102%	101%	75-125%	
Iron	ug/L	19	500	500	530	516	102%	99%	75-125%	



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**QUALITY CONTROL DATA**  
**SEMO PROJECT: Rivermines**

**ANALYSIS METHOD:** SM 2320B

**ANALYSIS DESCRIPTION:** 2320B Alkalinity

**MATRIX:** Water

Associated Lab Samples: L12-0001-2126, L12-0001-2127

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	3.01	5	4/5/12	

**LABORATORY CONTROL SAMPLE**

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	96.2	96%	85-115%	

**LABORATORY CONTROL SAMPLE DUPLICATE**

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	96.2	96%	85-115%	

**LABORATORY SAMPLE DUPLICATE 12-2126**

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	188	186	99%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.00	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	10	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	10.01	9.96-10.06	L11-0002-0079
Slope	99.1%	90-102%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

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#### METHOD BLANK MATRIX:

Associated Lab Samples: L12-0001-2126, L12-0001-2127

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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#### MATRIX SPIKE SAMPLE

##### SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

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#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115	



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## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

#### ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.  
**M** Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.  
**R** RPD value was outside control limits.

**NES** Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	TLL

Report Acceptance	
QAO	Date
GWP	4/6/2012
Manager	Date
EJS	4/6/2012

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**SEMO DIVISION -- CENTRAL LABORATORY**

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/6/12	12-2163	RM SEEP T	50	17290^	4.8	24	533	0.87 J	2.2	164	7.29
4/6/12	12-2163	RM SEEP D	[REDACTED]	18730****	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	8.3***	[REDACTED]	[REDACTED]
4/6/12	12-2164	RMP ROUGH T	2.3 J	5192^	ND	ND	302	1.3 J	1502^	195	6.97
4/6/12	12-2164	RMP ROUGH D	[REDACTED]	2211^	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	2003****	[REDACTED]	[REDACTED]

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



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## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2163, L12-0001-2164

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.10	0.38	4/9/12	
Copper	ug/L	ND	0.97	4/9/12	
Lead	ug/L	ND	2.7	4/9/12	
Zinc	ug/L	ND	0.91	4/9/12	
Nickel	ug/L	0.08	0.86	4/9/12	
Thallium	ug/L	1.4	1.86	4/9/12	
Iron	ug/L	0.76	NA	4/9/12	

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2163, L12-0001-2164

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/9/12	
Iron	ug/L	0.35	NA	4/9/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	459	92%	85-125%	
Copper	ug/L	500	485	97%	85-125%	
Lead	ug/L	500	456	91%	85-125%	
Zinc	ug/L	500	454	91%	85-125%	
Nickel	ug/L	500	456	91%	85-125%	
Iron	ug/L	500	477	95%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	487	97%	85-125%	
Iron	ug/L	500	493	99%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2164 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	479	466	96%	93%	75-125%	
Copper	ug/L	0.13	500	500	508	497	102%	99%	75-125%	
Lead	ug/L	0	500	500	475	463	95%	93%	75-125%	
Zinc	ug/L	52	500	500	531	516	96%	93%	75-125%	
Nickel	ug/L	3.8	500	500	478	464	95%	92%	75-125%	
Iron	ug/L	15	500	500	515	499	100%	97%	75-125%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2163, L12-0001-2164

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	0.4	5	4/9/12	

#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	100.8	101%	85-115%	

#### LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	99.08	99%	85-115%	

#### LABORATORY SAMPLE DUPLICATE 12-2163

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	164.1	165.1	101%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.00	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	10	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	10	9.96-10.06	L11-0002-0079
Slope	98.9%	90-102%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

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#### METHOD BLANK      MATRIX:

Associated Lab Samples: L12-0001-2163, L12-0001-2164

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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#### MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

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#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115		



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## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

#### ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.  
**M** Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.  
**R** RPD value was outside control limits.

**NES** Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	4/10/2012
Manager	Date
EJS	4/10/2012

**THE DOE RUN COMPANY**

**SEMO DIVISION -- CENTRAL LABORATORY**

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/9/12	12-2215	RM SEEP T	48	22280^	5.4	27	525	ND	2.5	158	7.2
4/9/12	12-2215	RM SEEP D	[REDACTED]	22990^***	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	ND	[REDACTED]
4/9/12	12-2216	RMP ROUGH T	2.0J	5764^	ND	ND	280	ND	1780^	188	6.87
4/9/12	12-2216	RMP ROUGH D	[REDACTED]	2210^	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	1637^	[REDACTED]

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



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## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK      MATRIX: Water

Associated Lab Samples: L12-0001-2215, L12-0001-2216

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	ND	0.38	4/9/12	
Copper	ug/L	ND	0.97	4/9/12	
Lead	ug/L	ND	2.7	4/9/12	
Zinc	ug/L	ND	0.91	4/9/12	
Nickel	ug/L	ND	0.86	4/9/12	
Thallium	ug/L	0.66	1.86	4/9/12	
Iron	ug/L	1.2	NA	4/9/12	

### METHOD BLANK      MATRIX: Water

Associated Lab Samples: L12-0001-2215, L12-0001-2216

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/9/12	
Iron	ug/L	ND	NA	4/9/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	490	98%	85-125%	
Copper	ug/L	500	498	100%	85-125%	
Lead	ug/L	500	486	97%	85-125%	
Zinc	ug/L	500	492	98%	85-125%	
Nickel	ug/L	500	490	98%	85-125%	
Iron	ug/L	500	491	98%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	486	97%	85-125%	
Iron	ug/L	500	504	101%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2216 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	538	530	108%	106%	75-125%	
Copper	ug/L	0.33	500	500	519	505	104%	101%	75-125%	
Lead	ug/L	0	500	500	499	493	100%	99%	75-125%	
Zinc	ug/L	58	500	500	622	613	113%	111%	75-125%	
Nickel	ug/L	3.6	500	500	501	492	99%	98%	75-125%	
Iron	ug/L	18	500	500	507	500	98%	96%	75-125%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2215, L12-0001-2216

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	0.4	5	4/10/12	

#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO3	100	100.8	101%	85-115%	

#### LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO3	100	99.08	99%	85-115%	

#### LABORATORY SAMPLE DUPLICATE 12-2215

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO3	158	163	103%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.00	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	10	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	10	9.96-10.06	L11-0002-0079
Slope	98.9%	90-102%	



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(573) 244-8105

## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

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#### METHOD BLANK      MATRIX:

Associated Lab Samples: L12-0001-2215, L12-0001-2216

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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#### MATRIX SPIKE SAMPLE

##### SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

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#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115	



Quentin J. Schmidt Analytical Laboratory  
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Viburnum, MO 65566  
(573) 244-8105

## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

#### ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.  
**M** Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.  
**R** RPD value was outside control limits.

**NES** Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	4/10/2012
Manager	Date
EJS	4/10/2012

# THE DOE RUN COMPANY

## SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/11/12	12-2266	RM SEEP T	52	18790^	6.0	28	562	ND	ND	163	7.32
4/11/12	12-2266	RM SEEP D		19780****					2.0***		
4/11/12	12-2267	RMP ROUGH T	128	4658^	1.8	0.56	312	0.84 J	1914^	182	6.95
4/11/12	12-2267	RMP ROUGH D		1040^					1626^		

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



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## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2266, L12-0001-2267

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	ND	0.38	4/12/12	
Copper	ug/L	ND	0.97	4/12/12	
Lead	ug/L	ND	2.7	4/12/12	
Zinc	ug/L	ND	0.91	4/12/12	
Nickel	ug/L	0.08	0.86	4/12/12	
Thallium	ug/L	ND	1.86	4/12/12	
Iron	ug/L	ND	NA	4/12/12	

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2266, L12-0001-2267

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/12/12	
Iron	ug/L	0.51	NA	4/12/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	495	99%	85-125%	
Copper	ug/L	500	488	98%	85-125%	
Lead	ug/L	500	484	97%	85-125%	
Zinc	ug/L	500	481	96%	85-125%	
Nickel	ug/L	500	485	97%	85-125%	
Iron	ug/L	500	490	98%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	484	97%	85-125%	
Iron	ug/L	500	478	96%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2267 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0.01	500	500	489	493	98%	99%	75-125%	
Copper	ug/L	0.77	500	500	494	499	99%	100%	75-125%	
Lead	ug/L	8.5	500	500	490	492	96%	97%	75-125%	
Zinc	ug/L	47	500	500	536	539	98%	98%	75-125%	
Nickel	ug/L	4	500	500	491	495	97%	98%	75-125%	
Iron	ug/L	19	500	500	515	511	99%	98%	75-125%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2266, L12-0001-2267

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.13	5	4/18/12	

#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO3	100	98.1	98%	85-115%	

#### LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO3	100	98.1	98%	85-115%	

#### LABORATORY SAMPLE DUPLICATE 12-2266

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO3	163.2	165.3	101%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.00	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	10	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	10	9.96-10.06	L11-0002-0079
Slope	98.7%	90-102%	



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## QUALITY CONTROL DATA

**SEMO PROJECT:** Rivermines

**ANALYSIS METHOD:** IC 300.00

**ANALYSIS DESCRIPTION:** ION CHROMOTOGRAPH 300.0

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METHOD BLANK      MATRIX:

Associated Lab Samples: L12-0001-2266, L12-0001-2267

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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**MATRIX SPIKE SAMPLE**

**SAMPLE NUMBER / NAME:**

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

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**LABORATORY CONTROL SAMPLE**

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115		



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(573) 244-8105

## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

#### ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.  
**M** Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.  
**R** RPD value was outside control limits.

**NES** Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	4/18/2012
Manager	Date
EJS	4/18/2012

**THE DOE RUN COMPANY**

**SEMO DIVISION -- CENTRAL LABORATORY**

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/13/12	12-2315	RM SEEP T	43	20880^	6.2	29	491	0.99J	2.4	150	7.19
4/13/12	12-2315	RM SEEP D	[REDACTED]	22930^***	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	5.7***	[REDACTED]	[REDACTED]
4/13/12	12-2316	RMP ROUGH T	2.2 J	7123^	0.40 J	ND	285	0.81 J	1379^	184	6.89
4/13/12	12-2316	RMP ROUGH D	[REDACTED]	2147^	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	1551^***	[REDACTED]	[REDACTED]

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



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## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK                  MATRIX: Water

Associated Lab Samples: L12-0001-2315, L12-0001-2316

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	ND	0.38	4/16/12	
Copper	ug/L	1.1	0.97	4/16/12	M
Lead	ug/L	0.22	2.7	4/16/12	
Zinc	ug/L	ND	0.91	4/16/12	
Nickel	ug/L	0.03	0.86	4/16/12	
Thallium	ug/L	ND	1.86	4/16/12	
Iron	ug/L	ND	NA	4/16/12	

### METHOD BLANK                  MATRIX: Water

Associated Lab Samples: L12-0001-2315, L12-0001-2316

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/16/12	
Iron	ug/L	ND	NA	4/16/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	450	90%	85-125%	
Copper	ug/L	500	533	107%	85-125%	
Lead	ug/L	500	465	93%	85-125%	
Zinc	ug/L	500	434	87%	85-125%	
Nickel	ug/L	500	453	91%	85-125%	
Iron	ug/L	500	494	99%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	484	97%	85-125%	
Iron	ug/L	500	504	101%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2316 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	502	512	100%	102%	75-125%	
Copper	ug/L	0.39	500	500	532	549	106%	110%	75-125%	
Lead	ug/L	0	500	500	477	485	95%	97%	75-125%	
Zinc	ug/L	71	500	500	576	586	101%	103%	75-125%	
Nickel	ug/L	3.8	500	500	482	479	96%	95%	75-125%	
Iron	ug/L	14	500	500	472	534	92%	104%	75-125%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2315, L12-0001-2316

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.13	5	4/18/12	

#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	98.1	98%	85-115%	

#### LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	98.1	98%	85-115%	

#### LABORATORY SAMPLE DUPLICATE 12-2315

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	149.8	156	104%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.00	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	10	9.96-10.06	L11-0002-0078
CCV Buffer 10.00	10	9.96-10.06	L11-0002-0079
Slope	98.7%	90-102%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

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#### METHOD BLANK      MATRIX:

Associated Lab Samples: L12-0001-2315, L12-0001-2316

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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#### MATRIX SPIKE SAMPLE

#### SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

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#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115		



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## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

#### ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.  
**M** Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.  
**R** RPD value was outside control limits.

**NES** Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	4/18/2012
Manager	Date
EJS	4/18/2012

**THE DOE RUN COMPANY**

**SEMO DIVISION -- CENTRAL LABORATORY**

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/16/12	12-2357	RM SEEP T	65	23590^	8.2	23	701	2.0	1.1	195	6.94
4/16/12	12-2357	RM SEEP D	[REDACTED]	25390****	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	5.6***	[REDACTED]	[REDACTED]
4/16/12	12-2358	RMP ROUGH T	3.0	5319^	ND	ND	263	1.1 J	1740^	191	6.87
4/16/12	12-2358	RMP ROUGH D	[REDACTED]	1697^	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	1486^	[REDACTED]	[REDACTED]

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



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## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2357, L12-0001-2358

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.02	0.38	4/17/12	
Copper	ug/L	0.94	0.97	4/17/12	
Lead	ug/L	0.03	2.7	4/17/12	
Zinc	ug/L	ND	0.91	4/17/12	
Nickel	ug/L	0.20	0.86	4/17/12	
Thallium	ug/L	0.30	1.86	4/17/12	
Iron	ug/L	1.7	NA	4/17/12	

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2357, L12-0001-2358

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/17/12	
Iron	ug/L	2.6	NA	4/17/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	453	91%	85-125%	
Copper	ug/L	500	511	102%	85-125%	
Lead	ug/L	500	461	92%	85-125%	
Zinc	ug/L	500	425	85%	85-125%	
Nickel	ug/L	500	452	90%	85-125%	
Iron	ug/L	500	475	95%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	463	93%	85-125%	
Iron	ug/L	500	501	100%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2358 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	522	526	104%	105%	75-125%	
Copper	ug/L	2.1	500	500	546	545	109%	109%	75-125%	
Lead	ug/L	0	500	500	489	493	98%	99%	75-125%	
Zinc	ug/L	53	500	500	565	566	102%	103%	75-125%	
Nickel	ug/L	3.5	500	500	485	487	96%	97%	75-125%	
Iron	ug/L	17	500	500	512	516	99%	100%	75-125%	



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**QUALITY CONTROL DATA**  
**SEMO PROJECT: Rivermines**

**ANALYSIS METHOD:** SM 2320B

**ANALYSIS DESCRIPTION:** 2320B Alkalinity

**MATRIX:** Water

Associated Lab Samples: L12-0001-2357, L12-0001-2358

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	4.1	5	4/18/12	

**LABORATORY CONTROL SAMPLE**

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	98.1	98%	85-115%	

**LABORATORY CONTROL SAMPLE DUPLICATE**

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	98.1	98%	85-115%	

**LABORATORY SAMPLE DUPLICATE 12-2357**

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	195.2	195.2	100%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.00	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	10	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	10	9.96-10.06	L11-0002-0079
Slope	98.7%	90-102%	



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(573) 244-8105

## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

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#### METHOD BLANK      MATRIX:

Associated Lab Samples: L12-0001-2357, L12-0001-2358

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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#### MATRIX SPIKE SAMPLE

##### SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

---

#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115		



Quentin J. Schmidt Analytical Laboratory  
43 Iron County Road No 1 Bldg 3  
Viburnum, MO 65566  
(573) 244-8105

## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
A	1/100 Dilution

#### ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.  
**M** Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.  
**R** RPD value was outside control limits.

**NES** Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	4/18/2012
Manager	Date
EJS	4/18/2012

**THE DOE RUN COMPANY**

**SEMO DIVISION -- CENTRAL LABORATORY**

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/18/12	12-2429	RM SEEP T	52	20980^	4.4	25	575	1.5	4.1	171	7.2
4/18/12	12-2429	RM SEEP D	[REDACTED]	21030^***	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	2.2	[REDACTED]	[REDACTED]
4/18/12	12-2430	RMP ROUGH T	29	5688^	ND	ND	277	ND	1105^	196	6.95
4/18/12	12-2430	RMP ROUGH D	[REDACTED]	964^	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	1120^***	[REDACTED]	[REDACTED]

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



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(573) 244-8105

## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2429, L12-0001-2430

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.13	0.38	4/18/12	
Copper	ug/L	ND	0.97	4/18/12	
Lead	ug/L	ND	2.7	4/18/12	
Zinc	ug/L	ND	0.91	4/18/12	
Nickel	ug/L	ND	0.86	4/18/12	
Thallium	ug/L	ND	1.86	4/18/12	
Iron	ug/L	1.3	NA	4/18/12	

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2429, L12-0001-2430

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/19/12	
Iron	ug/L	4.4	NA	4/19/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	472	94%	85-125%	
Copper	ug/L	500	507	101%	85-125%	
Lead	ug/L	500	471	94%	85-125%	
Zinc	ug/L	500	462	92%	85-125%	
Nickel	ug/L	500	473	95%	85-125%	
Iron	ug/L	500	484	97%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	455	91%	85-125%	
Iron	ug/L	500	486	97%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2430 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	533	529	107%	106%	75-125%	
Copper	ug/L	0	500	500	529	524	106%	105%	75-125%	
Lead	ug/L	0	500	500	506	504	101%	101%	75-125%	
Zinc	ug/L	57	500	500	604	601	109%	109%	75-125%	
Nickel	ug/L	3.2	500	500	503	501	100%	100%	75-125%	
Iron	ug/L	11	500	500	516	518	101%	101%	75-125%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2429, L12-0001-2430

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	0.51	5	4/20/12	

#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	98.7	99%	85-115%	

#### LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	99.8	100%	85-115%	

#### LABORATORY SAMPLE DUPLICATE 12-2429

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	170.7	171.5	100%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	7.00	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	10	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	9.99	9.96-10.06	L11-0002-0079
Slope	99.4%	90-102%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

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#### METHOD BLANK      MATRIX:

Associated Lab Samples: L12-0001-2429, L12-0001-2430

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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#### MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

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#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115	



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## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

#### ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.  
**M** Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.  
**R** RPD value was outside control limits.

**NES** Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	4/20/2012
Manager	Date
EJS	4/20/2012

**THE DOE RUN COMPANY**  
**SEMO DIVISION -- CENTRAL LABORATORY**

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Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/20/12	12-2532	RM SEEP T	67	23220^	10	27	780	ND	8.8	195	7.35
4/20/12	12-2532	RM SEEP D		23320****					ND		
4/20/12	12-2533	RMP ROUGH T	1.0 J	5935^	2.3	ND	286	ND	1647^	203	7.18
4/20/12	12-2533	RMP ROUGH D		7192^***					1241		

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



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## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2532, L12-0001-2533

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	ND	0.38	4/20/12	
Copper	ug/L	0.75	0.97	4/20/12	
Lead	ug/L	ND	2.7	4/20/12	
Zinc	ug/L	ND	0.91	4/20/12	
Nickel	ug/L	ND	0.86	4/20/12	
Thallium	ug/L	ND	1.86	4/20/12	
Iron	ug/L	3.9	NA	4/20/12	

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2532, L12-0001-2533

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/20/12	
Iron	ug/L	ND	NA	4/20/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	498	100%	85-125%	
Copper	ug/L	500	482	96%	85-125%	
Lead	ug/L	500	499	100%	85-125%	
Zinc	ug/L	500	495	99%	85-125%	
Nickel	ug/L	500	508	102%	85-125%	
Iron	ug/L	500	479	96%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	458	92%	85-125%	
Iron	ug/L	500	498	100%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2533 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0.04	500	500	496	497	99%	99%	75-125%	
Copper	ug/L	0.49	500	500	486	481	97%	96%	75-125%	
Lead	ug/L	0	500	500	495	497	99%	99%	75-125%	
Zinc	ug/L	59	500	500	551	552	98%	99%	75-125%	
Nickel	ug/L	3.5	500	500	511	510	102%	101%	75-125%	
Iron	ug/L	16	500	500	514	511	100%	99%	75-125%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2532, L12-0001-2533

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	2.03	5	5/2/12	

#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	101.4	101%	85-115%	

#### LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	101.4	101%	85-115%	

#### LABORATORY SAMPLE DUPLICATE 12-2532

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	194.6	197.6	102%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.93	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	9.89	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	9.99	9.96-10.06	L11-0002-0079
Slope	98.5%	90-102%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

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METHOD BLANK      MATRIX:

Associated Lab Samples: L12-0001-2532, L12-0001-2533

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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### MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

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### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115		



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Viburnum, MO 65566

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## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

#### ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.  
**M** Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.  
**R** RPD value was outside control limits.

**NES** Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	5/7/2012
Manager	Date
EJS	5/7/2012

# THE DOE RUN COMPANY

## SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/23/12	12-2569	RM SEEP T	45	20220^	4.7	24	501	ND	5.5	173	7.45
4/23/12	12-2569	RM SEEP D		20690^***					19***		
4/23/12	12-2570	RMP ROUGH T	ND	6115^	ND	ND	264	ND	1197^	183	6.9
4/23/12	12-2570	RMP ROUGH D		1503					1035^		

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



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Viburnum, MO 65566  
(573) 244-8105

## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2569, L12-0001-2570

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	ND	0.38	4/23/12	
Copper	ug/L	0.47	0.97	4/23/12	
Lead	ug/L	ND	2.7	4/23/12	
Zinc	ug/L	ND	0.91	4/23/12	
Nickel	ug/L	ND	0.86	4/23/12	
Thallium	ug/L	0.17	1.86	4/23/12	
Iron	ug/L	ND	NA	4/23/12	

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2569, L12-0001-2570

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/20/12	
Iron	ug/L	2.6	NA	4/20/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	484	97%	85-125%	
Copper	ug/L	500	503	101%	85-125%	
Lead	ug/L	500	489	98%	85-125%	
Zinc	ug/L	500	477	95%	85-125%	
Nickel	ug/L	500	488	98%	85-125%	
Iron	ug/L	500	498	100%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	486	97%	85-125%	
Iron	ug/L	500	503	101%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2570 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	543	544	109%	109%	75-125%	
Copper	ug/L	0.65	500	500	514	517	103%	103%	75-125%	
Lead	ug/L	0	500	500	506	509	101%	102%	75-125%	
Zinc	ug/L	61	500	500	624	620	113%	112%	75-125%	
Nickel	ug/L	3.4	500	500	507	510	101%	101%	75-125%	
Iron	ug/L	12	500	500	516	532	101%	104%	75-125%	



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**QUALITY CONTROL DATA**  
**SEMO PROJECT: Rivermines**

**ANALYSIS METHOD:** SM 2320B

**ANALYSIS DESCRIPTION:** 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2569, L12-0001-2570

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	2.03	5	5/2/12	

**LABORATORY CONTROL SAMPLE**

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	101.4	101%	85-115%	

**LABORATORY CONTROL SAMPLE DUPLICATE**

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	101.4	101%	85-115%	

**LABORATORY SAMPLE DUPLICATE 12-2569**

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	173.4	171.3	99%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.93	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	9.89	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	9.99	9.96-10.06	L11-0002-0079
Slope	98.5%	90-102%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

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#### METHOD BLANK      MATRIX:

Associated Lab Samples: L12-0001-2569, L12-0001-2570

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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#### MATRIX SPIKE SAMPLE

#### SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

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#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115		



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Viburnum, MO 65566  
(573) 244-8105

## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

#### ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.  
**M** Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.  
**R** RPD value was outside control limits.  
**NES** Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	5/7/2012
Manager	Date
EJS	5/7/2012

**THE DOE RUN COMPANY**

**SEMO DIVISION -- CENTRAL LABORATORY**

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/25/12	12-2643	RM SEEP T	50	23760^	4.9	27	575	ND	3.5	183	7.66
4/25/12	12-2643	RM SEEP D		24720***					3.9***		
4/25/12	12-2644	RMP ROUGH T	2.5	6109^	ND	ND	267	ND	1315^	186	7.35
4/25/12	12-2644	RMP ROUGH D		1415^					1211^		

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



Quentin J. Schmidt Analytical Laboratory  
43 Iron County Road No 1 Bldg 3  
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## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2643, L12-0001-2644

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.02	0.38	4/26/12	
Copper	ug/L	ND	0.97	4/26/12	
Lead	ug/L	ND	2.7	4/26/12	
Zinc	ug/L	ND	0.91	4/26/12	
Nickel	ug/L	0.11	0.86	4/26/12	
Thallium	ug/L	ND	1.86	4/26/12	
Iron	ug/L	ND	NA	4/26/12	

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2643, L12-0001-2644

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/26/12	
Iron	ug/L	3.7	NA	4/26/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	464	93%	85-125%	
Copper	ug/L	500	512	102%	85-125%	
Lead	ug/L	500	478	96%	85-125%	
Zinc	ug/L	500	463	93%	85-125%	
Nickel	ug/L	500	468	94%	85-125%	
Iron	ug/L	500	473	95%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	480	96%	85-125%	
Iron	ug/L	500	485	97%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2644 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	559	540	112%	108%	75-125%	
Copper	ug/L	1.8	500	500	553	536	110%	107%	75-125%	
Lead	ug/L	0	500	500	527	510	105%	102%	75-125%	
Zinc	ug/L	61	500	500	642	620	116%	112%	75-125%	
Nickel	ug/L	3.5	500	500	517	500	103%	99%	75-125%	
Iron	ug/L	13	500	500	513	496	100%	97%	75-125%	



Quentin J. Schmidt Analytical Laboratory  
43 Iron County Road No 1 Bldg 3  
Viburnum, MO 65566  
(573) 244-8105

**QUALITY CONTROL DATA**  
**SEMO PROJECT: Rivermines**

**ANALYSIS METHOD:** SM 2320B

**ANALYSIS DESCRIPTION:** 2320B Alkalinity

**MATRIX:** Water

Associated Lab Samples: L12-0001-2643, L12-0001-2644

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	2.03	5	5/2/12	

**LABORATORY CONTROL SAMPLE**

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	101.4	101%	85-115%	

**LABORATORY CONTROL SAMPLE DUPLICATE**

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	101.4	101%	85-115%	

**LABORATORY SAMPLE DUPLICATE 12-2643**

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	182.5	182.5	100%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.93	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	9.89	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	9.99	9.96-10.06	L11-0002-0079
Slope	98.5%	90-102%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

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#### METHOD BLANK      MATRIX:

Associated Lab Samples: L12-0001-2643, L12-0001-2644

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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#### MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

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#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec	Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115		



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## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

#### ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.  
**M** Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.  
**R** RPD value was outside control limits.

**NES** Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	5/7/2012
Manager	Date
EJS	5/7/2012

**THE DOE RUN COMPANY**

**SEMO DIVISION -- CENTRAL LABORATORY**

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/27/12	12-2673	RM SEEP T	68	26830^	7.6	27	750	1.2J	1.9	215	7.11
4/27/12	12-2673	RM SEEP D	[REDACTED]	26980^***	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	6.0***	[REDACTED]	[REDACTED]
4/27/12	12-2674	RMP ROUGH T	3.4	5941^	ND	ND	277	0.92 J	1174^	194	7.28
4/27/12	12-2674	RMP ROUGH D	[REDACTED]	46	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	1212^***	[REDACTED]	[REDACTED]

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



Quentin J. Schmidt Analytical Laboratory  
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## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2673, L12-0001-2674

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	ND	0.38	4/30/12	
Copper	ug/L	ND	0.97	4/30/12	
Lead	ug/L	ND	2.7	4/30/12	
Zinc	ug/L	ND	0.91	4/30/12	
Nickel	ug/L	0.11	0.86	4/30/12	
Thallium	ug/L	0.67	1.86	4/30/12	
Iron	ug/L	1.3	NA	4/30/12	

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2673, L12-0001-2674

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/30/12	
Iron	ug/L	2.3	NA	4/30/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	513	103%	85-125%	
Copper	ug/L	500	542	108%	85-125%	
Lead	ug/L	500	520	104%	85-125%	
Zinc	ug/L	500	509	102%	85-125%	
Nickel	ug/L	500	516	103%	85-125%	
Iron	ug/L	500	533	107%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	520	104%	85-125%	
Iron	ug/L	500	531	106%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2673 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0.17	500	500	563	562	113%	112%	75-125%	
Copper	ug/L	0.72	500	500	553	546	110%	109%	75-125%	
Lead	ug/L	0.18	500	500	533	534	107%	107%	75-125%	
Zinc	ug/L	268	500	500	840	832	114%	113%	75-125%	
Nickel	ug/L	9.7	500	500	534	534	105%	105%	75-125%	
Iron	ug/L	0	500	500	513	515	103%	103%	75-125%	



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Viburnum, MO 65566  
(573) 244-8105

## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: SM 2320B

ANALYSIS DESCRIPTION: 2320B Alkalinity

MATRIX: Water

Associated Lab Samples: L12-0001-2673, L12-0001-2674

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	2.03	5	5/2/12	

#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	101.4	101%	85-115%	

#### LABORATORY CONTROL SAMPLE DUPLICATE

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	101.4	101%	85-115%	

#### LABORATORY SAMPLE DUPLICATE 12-2673

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	215	218	101%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.93	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	9.89	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	9.99	9.96-10.06	L11-0002-0079
Slope	98.5%	90-102%	



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## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

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#### METHOD BLANK      MATRIX:

Associated Lab Samples: L12-0001-2673, L12-0001-2674

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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#### MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

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#### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115	



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## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

#### ANALYTE QUALIFIERS

- H** Analysis conducted outside the EPA method holding time.  
**M** Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.  
**R** RPD value was outside control limits.

**NES** Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	5/7/2012
Manager	Date
EJS	5/7/2012

# THE DOE RUN COMPANY

## SEMO DIVISION -- CENTRAL LABORATORY

PO BOX 500 VIBURNUM, MISSOURI Ph 573-244-8105 Fax 573-244-8181

Sample	Lab	Sample Name	Pb	Zn	Cu	Cd	Ni	Tl	Fe	Alka	pH
Date	Number		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
4/30/12	12-2715	RM SEEP T	73	26970^	11	26	774	3.6	1.1	196	6.94
4/30/12	12-2715	RM SEEP D		28460***					3.2***		
4/30/12	12-2716	RMP ROUGH T	3.7	5855^	ND	ND	272	1.7	1323^	225	6.95
4/30/12	12-2716	RMP ROUGH D		5.6					976^		

RL	2.7	0.91	0.97	0.38	0.86	1.4
MDL	0.85	0.28	0.3	0.12	0.27	0.58



Quentin J. Schmidt Analytical Laboratory  
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Viburnum, MO 65566  
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## SEMO PROJECT: Rivermines

ANALYSIS METHOD: EPA 200.7

ANALYSIS DESCRIPTION: 200.7 Metals, Total

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2715, L12-0001-2716

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Cadmium	ug/L	0.03	0.38	4/30/12	
Copper	ug/L	1.7	0.97	4/30/12	M
Lead	ug/L	ND	2.7	4/30/12	
Zinc	ug/L	ND	0.91	4/30/12	
Nickel	ug/L	0.11	0.86	4/30/12	
Thallium	ug/L	ND	1.86	4/30/12	
Iron	ug/L	2.7	NA	4/30/12	

### METHOD BLANK MATRIX: Water

Associated Lab Samples: L12-0001-2715, L12-0001-2716

Parameter	Units	Blank Result	RL	Analyzed	Qualifiers
Zinc	ug/L	ND	0.91	4/30/12	
Iron	ug/L	ND	NA	4/30/12	

### LABORATORY CONTROL SAMPLE, TOTAL

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Cadmium	ug/L	500	514	103%	85-125%	
Copper	ug/L	500	542	108%	85-125%	
Lead	ug/L	500	526	105%	85-125%	
Zinc	ug/L	500	511	102%	85-125%	
Nickel	ug/L	500	520	104%	85-125%	
Iron	ug/L	500	538	108%	85-125%	

### LABORATORY CONTROL SAMPLE, DISSOLVED

Parameter	Units	Spike Conc.	LCS Results	Rec	Limits	Qualifiers
Zinc	ug/L	500	517	103%	85-125%	
Iron	ug/L	500	530	106%	85-125%	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE

SAMPLE NUMBER / NAME: 12-2716 (1/100 Dil)

Parameter	Units	Results	Conc	Spike	Results	Results	Rec	Rec	Limits	Qual
Cadmium	ug/L	0	500	500	575	585	115%	117%	75-125%	
Copper	ug/L	1.4	500	500	558	572	111%	114%	75-125%	
Lead	ug/L	0.52	500	500	549	569	110%	114%	75-125%	
Zinc	ug/L	59	500	500	655	665	119%	121%	75-125%	
Nickel	ug/L	3.8	500	500	538	547	107%	109%	75-125%	
Iron	ug/L	13	500	500	555	569	108%	111%	75-125%	



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**QUALITY CONTROL DATA**  
**SEMO PROJECT: Rivermines**

**ANALYSIS METHOD:** SM 2320B

**ANALYSIS DESCRIPTION:** 2320B Alkalinity

**MATRIX:** Water

Associated Lab Samples: L12-0001-2715, L12-0001-2716

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity	mg/L	2.03	5	5/2/12	

**LABORATORY CONTROL SAMPLE**

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	101.4	101%	85-115%	

**LABORATORY CONTROL SAMPLE DUPLICATE**

Parameter	Units	Spike Conc	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	100	101.4	101%	85-115%	

**LABORATORY SAMPLE DUPLICATE 12-2715**

Parameter	Units	Results	Results Dup	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity	mg/L CaCO <sub>3</sub>	195.7	203.6	104%	85-115%	

pH SM4500-H+I	Results	QC Limits	Lab Standard Number
ICV Buffer 7.00	6.93	6.95-7.05	L11-0002-0077
ICV Buffer 4.00	4.00	3.95-4.05	L11-0002-0101
ICV Buffer 10.01	9.89	9.96-10.06	L11-0002-0078
CCV Buffer 10.01	9.99	9.96-10.06	L11-0002-0079
Slope	98.5%	90-102%	



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Viburnum, MO 65566  
(573) 244-8105

## QUALITY CONTROL DATA

### SEMO PROJECT: Rivermines

ANALYSIS METHOD: IC 300.00

ANALYSIS DESCRIPTION: ION CHROMOTOGRAPH 300.0

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METHOD BLANK      MATRIX:

Associated Lab Samples: L12-0001-2715, L12-0001-2716

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Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/l		0.63		

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### MATRIX SPIKE SAMPLE

SAMPLE NUMBER / NAME:

Parameter	Units	Results	MS Spike Conc	MSD Spike	MS Results	MSD Results	MS % Rec	MSD % Rec	% Rec	Qual
Sulfate 12-1341	mg/l		5	5			0%	0%	75-125	

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### LABORATORY CONTROL SAMPLE

Parameter	Units	Spike Conc.	LCS Results	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/l	5		0%	85-115	



Quentin J. Schmidt Analytical Laboratory

43 Iron County Road No 1 Bldg 3

Viburnum, MO 65566

(573) 244-8105

## QUALIFIERS

### SEMO PROJECT

#### DEFINITIONS

NA	Not Analyzed
ND	Not detected/ below Method Detection Limit.
B	Potential false positive value based upon blank sample data validation procedures.
E	Estimated value, exceeded the instrument calibration range.
H	Recommended sample preservation, extraction or analysis holding time was exceeded.
J	Lower than reporting limit and higher than MDL and is an estimated value.
M	Per client request, metals analysis was conducted less than 16 hours from sample collection/preservation.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
***	Dissolved result > than associated Total result.
^	1/100 Dilution

#### ANALYTE QUALIFIERS

H Analysis conducted outside the EPA method holding time.

M Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

R RPD value was outside control limits.

NES Not enough sample.

Method	Analysts
200.7	TLL
Alka	JAA
IC	

Report Acceptance	
QAO	Date
GWP	5/7/2012
Manager	Date
EJS	5/7/2012